

**REMARKS**

Claims 29 - 42, 52, and 56 are now pending in the application.

Two paragraphs added by amendment filed April 13, 2001 were objected to under 35 U.S.C. 132 because they introduced new matter into the disclosure.

Claim 42 was rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

Claims 29 - 42 and 52 were rejected under 35 U.S.C 103 (a) as being obvious over Zimmerman et. al. (DE 42 04 012 A1) or Klöck et. al. (Appl Microbiol Biotechnol (1994) 40:638-643).

**Amendments**

The two paragraphs added by amendment filed April 13, 2001 have been cancelled.

Claim 42 has been amended to recite the use of alginate-producing fresh-water or salt-water algae.

Claim 29 has been amended to recite extracting an algae material with a complex forming agent for providing a solution containing solved alginate.

Claim 52 has been amended so as not to refer to a cancelled claim. The content of original claim 43, now cancelled, has been incorporated into amended Claim 52. No new matter has been introduced.

Claim 56 has been added to recite the use of brown algae.

**Rejection under 35 U.S.C. 132**

Cancellation of the two added paragraphs of the April 13, 2001 amendment is requested above.

**Rejection under 35 U.S.C. 112, second paragraph**

In accordance with the examiner's recommendation, claim 42 has been amended to recite only alginate-producing fresh-water or salt-water algae, and claim 56 has been added, which recites only brown algae. No new matter has been introduced.

**Rejection under 35 U.S.C. 103 (a)**

Claims 29 through 42 and 52 have been rejected under 35 U.S.C. 103 (a) as being unpatentable over Zimmermann et. al. (DE 42 04 012 A1) or Klöck et. al. (Appl Microbiol Biotechnol (1994) 40:638-643). Applicants respectfully submit that claim 29, as amended, overcomes these rejections and is patentable over these two references.

Claim 29 was amended to recite that the addition of a complex forming agent forms a solution containing a solved alginate. This amendment is supported in the specification on p. 7, paragraph 4. No new matter has been introduced.

Applicants respectfully submit that claim 29 recites a distinct process from those taught by Klöck et. al. and Zimmermann et. al. Furthermore, the present invention results in an alginate composition distinct from, and having unique advantages over, the resulting compositions in either of these two references.

MPEP 2143 states:

To establish a *prima facie* case of obviousness, three basic criteria must be met.

First there must be some suggestion or motivation, either in the references

themselves or in the knowledge generally available to one of ordinary skill in the

art, to modify the reference . . . . Second, there must be a reasonable expectation of success. Finally, the prior art reference . . . must teach or suggest all the claim limitations.

There is no suggestion or motivation in either reference to use a complex-forming agent to solve the alginate into solution as a first step. In this invention, the starting raw material is naturally occurring plant matter. The alginates are extracted directly into solution from the plant matter by use of a complex forming agent. It is known to those skilled in the art that alginates in the raw plant material are bound with multivalent cations. In the present invention the chosen complex forming agent has a higher affinity for the multivalent cations than for the alginate. The agent binds to these cations, leaving the alginate in a true dissolved state as a salt in a solution of close to neutral pH. A key aspect of the present invention, then, is that *the complex forming agent does not bind to the alginate itself*. The materials other than the alginate are separated from the solution by filtering and the alginate is then precipitated out of solution as a salt. This step also acts as a purification step. Thus, in contrast to the processes taught in each of the references, the present invention completes the purification in solution, does not require acid extraction, and does not require dialysis. The advantages of these differences are discussed in the specification, e.g. pp 2 - 4; p. 5 paragraph beginning at line 17.

By contrast, both references use a commercial solved alginate as the starting material. (See Klöck et. al., p. 640, left column, paragraph 3, first sentence; and Zimmermann et. al., column 3, line 47; column 4, line 18.) Applicants respectfully submit that neither reference suggests or motivates the use of naturally occurring starting material. The alginate obtained with naturally occurring starting material in the present invention has distinct, novel properties from

that obtained from commercial alginates. For example the alginates of the present invention have higher molecular weight and resulting lower toxicity. (See Specification, p.2, 16 through p. 5, line 34.) Without any suggestion or motivation in the references it would not have been obvious to one skilled in the art to modify the references by using naturally occurring starting material in order to produce an alginate with these desirable properties.

In the two references cited by the examiner, the commercial solved alginate is put into solid form using a barium-containing solution. It is known to those skilled in the art that this solid form is a polymer, and not a precipitated salt. (See e. g. Klöck et. al., p. 640, fourth paragraph.) As indicated by Klöck et. al., barium-alginate complexes are stable (i.e. insoluble) in acid and neutral solutions, and soluble only in highly alkaline solution. By contrast, in the present invention the alginate is isolated in a nearly neutral solution and remains solved. Moreover, the complex forming agent does not bind to the alginate but rather to the multivalent cations in the naturally occurring starting material. Thus the role of the barium in the references is not at all analogous to the role of the complex-forming agent in the present invention. There is thus no motivation in the references to substitute for the barium a complex-forming agent that would act in the manner described in the present invention, and it would not have been obvious to one skilled in the art to make such substitution.

Claim 29 recites a distinct, non-obvious invention over the two references. Claims 30 through 42, and 52 properly depend either directly or indirectly from claim 29. Applicants therefore respectfully traverse the rejections of Claims 29-42 and 52.

**CONCLUSION**

Applicants believe that the foregoing amendments and remarks have overcome or rendered moot all grounds for rejection, and that the application is in a condition for allowance. Applicants therefore respectfully request prompt action on the claims and allowance of the application. If the Examiner believes that personal communication will expedite prosecution of the application, the Examiner is invited to telephone Applicants' undersigned agent directly.

**AUTHORIZATION**

Applicants believe that no extension of time is required to make submission of the response timely. However, in the event that an extension of time is required, Applicants hereby submit a petition for such extension of time as may be necessary to make this response timely. The Commissioner is hereby authorized to charge any necessary additional fees for extension of time to deposit account No. 502194. A duplicate of this Authorization is enclosed.

Respectfully Submitted,

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**Date: January 22, 2003**

**MARKED-UP COPY OF CLAIMS SHOWING CHANGES**

29. A process for obtaining a highly purified alginate composition, the process comprising the steps of:
- extracting an algae material [in a solution] with a complex forming agent for providing a solution containing solved alginate,
  - filtering the solution,
  - precipitating [an] the alginate out of the solution,
  - collecting and dewatering the precipitated alginate, and
  - repeating the steps a) to d) at least once.
42. A process according to Claim 29 wherein the algae material used in the process is [brown algae or other] an alginate-producing fresh-water or salt-water algae.
52. An alginate composition [according to Claim 43], manufactured by the process according to claim 29, and comprising a mixed polymer of mannuronic acid and guluronic acid, in which the ratio of mannuronic acid to guluronic acid in the mixed polymer is in the range from about 0.1 to about 9, and the mean molecular weight of the mixed polymer is greater than about 350 kD.
56. A process according to Claim 29, wherein the algae material used in the process is brown algae.